Comments by the author on the draft article "Recalculating Bazant and Zhou's Overload Ratio" (Urich 2007)

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This draft article is a refinement of the analysis presented in "Why Did the World Trade Center Collapse?-Simple Analysis" (Bazant and Zhou, 2002), and has been presented only for the purpose of eliciting comments. The article includes a number of errors or omissions which invalidate the results.

The primary error is the use of the ultimate strength which while valid in static applications is not valid as applied to a dynamic situation. Further study by the author in the area of inelastic buckling leads the author to conclude that buckling would occur close to the elastic limit or yield stress. This has been calculated using the Johnson parabola method with help from Tony Szamboti and is presented in another draft article regarding the "Load Distribution and Load Capacity in the Core of WTC1 (Urich 2007)". When this error is corrected the overload is ratio becomes greater than one indicating continued collapse. Preliminary calculations including other omissions indicate that the overload ratio is probably between 2 and 4 when all major factors are included.

With this in mind, the draft articles may still be of interest to those interested in further study of these issues.

http://www.cool-places.0catch.com/docs/DraftOverload.pdf

http://www.cool-places.0catch.com/911/loadDistribution_v1.pdf

A quick note on Gordon Ross's analysis:

Gordon Ross has elaborated on the Bažant and Zhou model and analysis to try and make them more realistic and concludes that the collapses would have arrested. While Ross's criticisms of the Bazant model are valid, there are problems with Ross's analysis that make his conclusion incorrect.

The first problem with Ross's analysis is that main assumption in the Bazant model (i.e. evenly distributed axial column impacts) is grossly in favor of survival of the structure. This assumption cannot be ignored as it is the basis for both analyses. To make the model more realistic we must also assume that there are in fact no axial impacts this has large implications for the rest of Ross's analysis.

The second problem is that Ross assumes a plastic shortening phase which, by all means, would be likely in the pure Bazant model. However, eccentricities and moments caused by non-axial impacts would cause buckling prior to any plastic shortening. Without plastic shortening, the elastic wave has too little time to progress very far down the building, which means his estimate of 24 floors being involved in the collision is probably grossly overestimated.

The third problem is that Ross assumes that energies from elastic deformation and plastic deformation (including any concrete comminution) are not included in the inelastic collision which he uses to model the impact. If an inelastic collision is assumed, all plastic energy (including inelastic buckling and concrete comminution) is necessarily included in the energy associated with the inelastic collision. This problem alone invalidates his conclusion.